

REMARKS

Priority Claim

Applicant notes that the Examiner has indicated the necessity of referencing prior application(s) in the first sentence of the specification when priority is claimed. Applicant has done so, in the application as filed, and has updated the information herein. If anything further is requested, the Examiner is requested to contact Applicant's undersigned attorney.

The Outstanding Office Action

The Office Action mailed February 25, 2005, has been received and reviewed. Claims 1 through 15 are currently pending in the application. Claims 5 and 12 are withdrawn from consideration as being drawn to a non-elected invention. Claims 1 through 4, 6 through 11 and 13 through 15 stand rejected. Applicants have amended claims 1, 13, 14 and 15, and respectfully request reconsideration of the application as amended herein.

35 U.S.C. § 103(a) Obviousness Rejections

Obviousness Rejection Based on U.S. Patent No. 5,726,500 to Duboz et al. in view of U.S. Patent No. 6,075,290 to Schaefer et al. further in view of U.S. Patent No. 6,441,487 to Elenius et al.

Claims 1 through 4, 6 through 11 and 13 through 15 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Duboz et al. (U.S. Patent No. 5,726,500) in view of Schaefer et al. (U.S. Patent No. 6,075,290), further in view of Elenius et al. (U.S. Patent No. 6,441,487). Applicants respectfully traverse this rejection, as hereinafter set forth.

M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, **the prior art reference (or references when combined) must teach or suggest all the claim limitations.** The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir.

1991). (Emphasis added).

Applicant wishes to thank the Examiner for his comprehensive and detailed rejection in the body of the Office Action. Applicant has amended the claims to address the Examiner's concerns, and respectfully asserts that the claims, as presently amended, patentably define over the art as applied herein.

Applicant has extensively amended claim 1 to recite the elements of which the claimed invention "consists essentially of" and to delineate the nature of the size and configuration of the metal-lined via for receiving, without deformation, a claimed portion (height) of a substantially spherical interconnection element protruding from a semiconductor device, and specifically "the at least one substantially spherical interconnection element protruding from the at least one semiconductor device to a depth corresponding to approximately 10% to 50% of an overall height of the substantially spherical interconnection element and establish an electrical connection therewith by way of biased contact of only a portion of an interior surface of the metal-lined via with only a portion of an exterior surface of the substantially spherical interconnection element received therewithin."

Thus, claim 1 is distinguished from the applied Duboz, Schaefer and Elenius references, all of which show solder balls in bonded contact with a conductive trace or a metal lining of a via. Applicant acknowledges, without agreeing with, the Examiner's characterization of what may comprise "temporary" contact between a solder ball and a metal element, insofar as a solder ball may be heat to reflow to de-bond from the metal element. However, the present claim characterization or inference of a temporary or permanent nature of contact, but relies upon interrelated structural details of the substantially spherical connection element of the semiconductor device and the metal-lined via of the claimed substrate. Applicant also respectfully notes that the use of "consisting essentially of" in the recitation of the invention of claim 1 further distinguishes the nature of the claimed substrate, since any solder ball or other substantially spherical interconnection element to be received by the metal-lined via is excluded from the claim, as the inclusion of such an interconnection element would render the invention, as claimed, inoperable to function according to the recited structure. Accordingly, Applicant respectfully requests withdrawal of the rejection.

Claim 2 has been canceled, the subject matter thereof having been incorporated in claim 1 as amended herein.

Claims 3, 4, 6 through 11 and 13 through 15 are allowable as depending from claim 1.

Claim 3 is further allowable (as is the subject matter of claim 2 now included in claim 1) as the combination of references fails to meet the recitations of claim 1 or claim 3 (by dependency) that the nature of the substantially spherical interconnection element receipt by and electrical connection with the metal-lined via is by way of contact of only a portion of the exterior surface of the substantially spherical interconnection element with only a portion of the interior surface of the metal-lined via. Applicant submits that it would not be an obvious design choice to select the claimed relationship of element to via, as the references do not teach receipt of a solid interconnection element by a via and the contact as claimed, but teach reflowed solder balls which, of necessity, slump into and wet to the metallization of the via when in a liquid state.

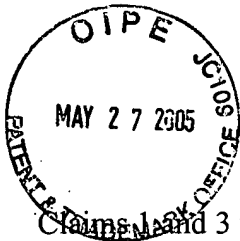
Applicant also respectfully asserts that claims 13-15, as amended herein, clearly define over the references when the recitations thereof are read in combination with those of claim 1. Specifically, the portions of surface contact between the substantially spherical element and the metal-lined via are further defined to be only (by way of the recitation "consisting of" in claims 13 and 14) one or more lines on the interior surface of the metal-lined via either at least partially circling or circling the substantially spherical interconnection element.

Reconsideration and withdrawal of the rejections of claims 3, 4, 6 through 11 and 13-15 is respectfully requested.

Applicant further notes that, upon allowance of claim 1, nonelected claims 5 and 12 would also be allowable.

ENTRY OF AMENDMENTS

The amendments to claims 1 and 13-15 above should be entered by the Examiner because the amendments are supported by the as-filed specification and drawings and do not add any new matter to the application.



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CONCLUSION

Claims 1 and 3 through 15 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, he is respectfully invited to contact Applicant's undersigned attorney.

Respectfully submitted,

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